***http://www.biologycorner.com/fruitfly/fruitflytutorial_header.gif***

|  |  |  |  |
| --- | --- | --- | --- |
| ***K:*** /8 | ***A:***  /6 | ***T:***  /18 | ***C:***  /4 |

***Instructions:***

Please proceed to the following website:<http://www.biologycorner.com/fruitflygenetics/index.html>

In this virutal lab you will be investigating Mendelian laws of inheritance by crossing fruit flies. Look over the phenotype booklet provided in order to familiarize yourself with the various fruit flie phenotypes. For each cross you will be examining the F1 and F2 phenotypes. By considering the parental genotypes and offsprings’ phenotypes you will ba able to determine whether the traits are inherited through sex linked or autosomal inheritance.

Before begginning the virtual simulation, please ensure to read the background information on the homepage and complete the prelab questions bellow.

**Pre-lab Questions**:

1. Why are fruit flies a good subject for genetic studies? (2 K)

- Small animal, short life cycle, cost effective and easy to keep large numbers.

- Mutant flies are available, and the entire genome has recently been sequenced.

1. Describe the life cycle of Drosophila melangaster.(2 K)

* Life cycle is like other insects- eggs (embryo) are laid, develop into larva (1st, 2nd, 3rd instar) then prepupa, pupa and finally adult form

1. What tools would you need to study fruit flies in the lab? (2 K)

-vials containing culture medium, anaesthetic, paint brush, stereoscope

4. Show the abbreviations that would be used to denote a fly with dumpy (dp) wings and a wild type fly that is carrying the allele for dumpy wings. The allele is not located on the sex chromosome. (2 K)

- Fly with dumpy wings: dp dp  Carrier for dumpy wings: dp+ dp

**Crossing Fruit Flies**

***Instructions:***

Before crossing the flies ensure that you recognize male and female fruit flies for this will be pertinent to your phenotypic calculations.

Click on the “Sexing Fruit Flies” to become better acquainted with these differences and answer the two questions below.

1. Describe the differences between male fruit flies and female fruit flies. (1T)

- males have a sex comb and black bristles on the forelegs.

- Female have an elongated and pointed tip. Males are more rounded.

2. How many male and female fruit flies were present in the simulation? (1T)

-Male: 4 Female: 4

***Instructions:***

For the first cross, click on the *“*[*Simple Cross: Wild Type Female x Vestigial Winged Male*](http://www.biologycorner.com/fruitflygenetics/flash1.html)*”* found at the bottom of the home page.

Once on the desired page, mate the flies to obtain the F1 progeny and fill out the table below. In order to better identify the progeny, use the phenotype booklet that was provided to you.

Mate the flies from the F1 generation to obtain the F2 progeny and fill out the table below.

By clicking on the fly you can get a closer look at the fly’s phenotypic characteristic. This may be useful in helping you determine whether it is male or female.

**Cross 1: Wild Type Female x Vestigial Winged Male** (4T)

|  |  |  |
| --- | --- | --- |
|  | F1 Generation | F2 Generation |
| Wild Type Males | http://www.biologycorner.com/resources/spacer.gif7 | http://www.biologycorner.com/resources/spacer.gif5 |
| Vestigial Winged Males | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif2 |
| Wild Type Females | http://www.biologycorner.com/resources/spacer.gif7 | http://www.biologycorner.com/resources/spacer.gif6 |
| Vestigial Winged Females | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif1 |

1. What is the genotype of the parents and how is vestigial wings inherited (autosomal or sex linked)? Explain your reasoning. (2 A)

  Wild Type Female- vg+vg+

Vestigial Winged Male- vg vg

Vestigial wings is an autosomal recessive trait because the F1 cross produced F2 offspring with a phenotypic ratio of approximately 3:1.

***Instructions:***

In order to complete the second cross, return to the home page and select “[White Eyed Female x Wild Type Male](http://www.biologycorner.com/fruitflygenetics/flash2.html)”.

Similarly to the first cross, mate the white eyed female to the wild type male to obtain the F1 generation, and mate the F1 progeny to obtain the F2 generation In order to better identify the phenotype, anesthetise the flies and sort them. Once sorted, copy the results onto the table below.

**Cross 2: White Eyed Female x Wild Type Male** (4 T)

|  |  |  |
| --- | --- | --- |
|  | F1 Generation | F2 Generation |
| Wild Type Males | http://www.biologycorner.com/resources/spacer.gif1 | http://www.biologycorner.com/resources/spacer.gif4 |
| White eyed Males | http://www.biologycorner.com/resources/spacer.gif6 | http://www.biologycorner.com/resources/spacer.gif3 |
| Wild Type Females | http://www.biologycorner.com/resources/spacer.gif7 | http://www.biologycorner.com/resources/spacer.gif3 |
| White Eyed Females | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif4 |

1. What is the genotype of the parents and how is eye color inherited (autosomal or sex linked)? (2A)

White Eyed Female- Xw Xw

Wild Type Male- Xw+ Y

Eye colour is sex linked as the F1 generation males were white eyed and the F2 generation had a phenotypic ratio of 1:1.

***Instructions:***

In order to complete the third cross, return to the home page and select “[Wild Type Female x Sepia Eyed, Vestigial Winged Male](http://www.biologycorner.com/fruitflygenetics/flash3.html)”

Mate the flies to obtain the F1 and F2 generations. When determining the phenotype make sure to consult the “phenotype booklet” provided. Once the phenotypes have been sorted and determined, write the results in the table below.

**Cross 3:** **Wild Type Female x Sepia Eyed, Vestigial Winged Male** (8 T)

|  |  |  |
| --- | --- | --- |
|  | F1 Generation | F2 Generation |
| Wild Type Males | http://www.biologycorner.com/resources/spacer.gif7 | http://www.biologycorner.com/resources/spacer.gif5 |
| Wild Type Female | http://www.biologycorner.com/resources/spacer.gif7 | http://www.biologycorner.com/resources/spacer.gif4 |
| Total Wild Types | http://www.biologycorner.com/resources/spacer.gif14 | http://www.biologycorner.com/resources/spacer.gif9 |
| Vestigial Winged Males (normal antenna) | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif1 |
| Vestigial Winged Females (normal antenna) | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif2 |
| Total Vestigial Winged (normal antenna) | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif3 |
| Aristapedia Males (normal wings) | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif2 |
| Aristapedia Females (normal wings) | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif2 |
| Total Aristapedia (normal wings) | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif4 |
| Vestigial Wings, Aristapedia Males | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif1 |
| Vestigial Wings, Aristapedia Females | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif1 |
| Total Vestigial Wings, Aristapedia | http://www.biologycorner.com/resources/spacer.gif0 | http://www.biologycorner.com/resources/spacer.gif2 |

1. What is the genotype of the parents and how is aristapedia and vestigial wings inherited (autosomal or sex linked)? (2 A)

Wild Type Female- vg+ vg+ ar+ ar+

Vestigal Winged, Aristapedia Anntenae Male- vg vg ar ar

Aristapedia and vestigial wings are autosomal because the phenotypic ratio of the F2 generation was approximately 9:3:3:1